

WHAT IS CLAIMED IS

1. A gas purifying system for purifying an object gas comprising:

5 a gas flow line through which the object gas to be purified flows from an object gas generation mechanism;

a discharge reaction device provided on a way of the gas flow line;

10 a filter member disposed in the discharge reaction device having a structure for trapping particular matter contained in the object gas during a time when the object gas passes through the filter member; and

15 a discharge generation device operatively connected to the discharge reaction device for causing electric field inside the discharge reaction device and generating discharge plasma therein.

2. The gas purifying system according to claim 1, wherein said filter member has a block structure composed of a plurality of packed solid materials.

3. The gas purifying system according to claim 1, wherein said filter member has a block structure composed of fibrous material.

25 4. The gas purifying system according to claim 1, wherein

said filter member has a honey-comb structure.

5. The gas purifying system according to claim 1, wherein said filter member has a monolith structure.

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6. The gas purifying system according to claim 1, wherein said filter member is composed of a dielectric material having dielectric constant of not less than 3.

10 7. The gas purifying system according to claim 6, wherein said dielectric material is a ceramics.

8. The gas purifying system according to claim 1, further comprising an oxidizing catalyst disposed inside the discharge
15 reaction device for oxidation combustion of the particulate matter.

9. The gas purifying system according to claim 1, further comprising an oxidizing catalyst arranged to the gas flow line
20 at at least one of upstream side and downstream side of the discharge reaction device with respect to the object gas flow.

10. The gas purifying system according to claim 1, further comprising a photocatalyst disposed inside the discharge
25 reaction device so as to be activated by a discharged light.

11. The gas purifying system according to claim 1, wherein the discharge generation device generates a low temperature plasma.

5 12. The gas purifying system according to claim 1, wherein said filter member is provided with a reduction decomposition catalyst for reducing and decomposing nitrogen oxide contained in the object gas.

10 13. The gas purifying system according to claim 11, further comprising a hydrocarbon adding device disposed to the gas flow line on the upstream side of the discharge reaction device so as to apply gaseous hydrocarbon to the object gas flowing through the gas flow line.

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14. The gas purifying system according to claim 13, wherein said gaseous hydrocarbon is formed by gasifying solid or liquid state hydrocarbon by the hydrocarbon adding device.

20 15. The gas purifying system according to claim 1, further comprising a catalyst reaction unit provided at the gas flow line on a downstream side of the discharge reaction device for reducing and decomposing nitrogen oxide contained in the object gas.

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16. The gas purifying system according to claim 15, further

comprising a hydrocarbon adding device disposed to the gas flow line on the upstream side of the discharge reaction device so as to apply gaseous hydrocarbon to the object gas flowing through the gas flow line.

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17. The gas purifying system according to claim 15, wherein said gaseous hydrocarbon is formed by gasifying solid or liquid state hydrocarbon by the hydrocarbon adding device.

10 18. The gas purifying system according to claim 1, wherein said discharge reaction device has an outer cylindrical casing to which a connector is provided, and said discharge generation device includes a high voltage pole side connected to the connector through a cable, an electrode rod disposed
15 inside the filter member and connected to the connector through a cable, and an earth pole side connected to a portion of the outer casing of the discharge reaction device, which functions as an earth electrode.

20 19. A gas purifying system for purifying an object gas comprising:

a gas flow main line through which the object gas to be purified flows from an object gas generating mechanism, said main gas flow line having a switching portion from which a
25 plurality of gas flow branch lines extend;
a plurality of discharge reaction devices each provided at

an intermediate portion of each of the gas flow branch lines;

a filter member disposed in each of the discharge reaction devices having a structure for trapping particular matter contained in the object gas during a time when the

5 object gas passes through the filter member;

a discharge generation device operatively connected to each of the discharge reaction devices for causing electric field inside the discharge reaction device and generating discharge plasma therein; and

10 a switching means arranged for the switching portion formed to the gas flow main line for selectively switching the gas flow branch lines.

20. The gas purifying system according to claim 19, wherein
15 said plurality of gas flow branch lines are combined at a portion of the gas flow main line on the downstream side of the discharge reaction devices.

21. A gas purifying method of purifying an object gas
20 comprising the steps of:

arranging a discharge reaction device, provided with a filter member, on a way of a gas flow line through which the object gas including particular matter to be treated flows;

trapping particular matter in the object gas by the filter
25 member; and

generating an electric field in an area in which the filter

member is disposed and generating a discharge plasma in the discharge reaction device.

22. A discharge reaction apparatus comprising:

- 5 a cylindrical discharge reaction device;
- a filter member disposed inside the discharge reaction device; and
- a high voltage pole side and an earth pole side between which said filter member is arranged.

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